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ABSTRACT

The objective of Project SCATE (Students Concerned About Tomorrow's Environment) is for students to investigate environmental problems and the political processes involved in their solution. The four identified areas of concern are: (1) land use policy development; (2) air and water quality; (3) energy allocation and consumption; and (4) economic considerations related to the quality of life. This document contains instructional units, including objectives and activities, centering around the four concerns. Unit titles are: (1) Identifying a problem; (2) Clearly stating a problem; (3) Determining testable and non-testable statements; (4) Generalizing; (5) Model Assembly; (6) Land Use; (7) Discovering a biological community; (8) Children's forest controversy; (9) Great swamp; and (10) Urban studies. (TM)

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INTRODUCTORY

CURRICULUM

MATERIALS

PROJECT

SCATE

SE 028 253

Environmental Education: A National Concern

The industrial revolution ushered in the Age of Energy and the Urban Society. Commencing in the 1860's in the United States, the industrial revolution was the major force that transformed Thomas Jefferson's "Agrarian Democracy" into an urban-industrial super power. Until 1850 people in the United States obtained two-thirds of their energy from muscle, human and animal. Space heating was primarily provided by wood or other fuels from vegitation. Industry was powered by water or wind. Vast areas of the continental United States remained uncultivated due to the lack of plows strong enough to turn the earth. Man lived in daily contact with his natural environment.

The age of coal, iron and steel erupted in the United States in the 1860's. Spurred by a Civil War, and the need for a new focus following the War, the United States began the exploitation of steam power. Steam powered locomotives, industrial machines, tractors, threshers and electrical generators made the country an industrial giant. Coal became dominant. By 1910, 90% of the energy consumed in the United States came from coal. Man began to move to urban areas in large numbers. The Age of Energy began to blossom.

The turn of the century brought with it a new era, the era of oil. The mass production of Model T Fords, the successful flight of Kitty Hawk and the ingenious inventions of Thomas Edison brought with them a tremendous thirst for liquid fuel. New discoveries of "big oil" in the southwestern United States and in the Middle East encouraged the use of oil as the primary source of energy. By the 1970's, oil and natural gas provided 75% of the energy used in the United States. Coal fell from the 90% figure in 1910, to 40% in 1950, and to 17% in 1970. The consumer of this new energy lost contact with the environmental source of his fuel and often lost sight of the fuel itself.

The rise of the industrial energy dependent, society brought with it:

- air pollution from the consumption of coal and oil in factories, generating plants and automobiles.
- land use problems as super highways, suburban development, refineries, oil derricks, strip mines, and expanding industry consumed more land and increased the production of solid waste.
- water pollution from inadequate sewage systems for ever growing cities, uncontrolled dumping from large industry, run off of commercial fertilizers, and heating of water from generating plants.
- economic problems as more and more industries competed for a fixed supply of resources.
- dramatic changes in the quality of life, as less and less importance was placed on the energy produced by human muscle, and as more and more labor saving devices were provided to the consumer.
- reduction in the demand for human labor accompanied by an increasing supply of labor (an increase in population) and larger amounts of leisure time.

The most dramatic changes have taken place in the past 50 to 75 years, the period of the 20th century. Prior to 1920, over 50% of the population of the United States was located in rural areas. The total commercial energy consumed prior to 1900 was approximately equal to the amount consumed in one year at present levels. World War I was the last great war in which the horse played an important role; World War II ushered in the Atomic Age. In a period of one lifetime, man has broken from centuries of dependence on land travel, primarily by horse, to the freedom of air and space travel. He has escaped from centuries of relative isolation into a new age of instant, transcontinental, communication.

This rapid achievement in science and technology has not been accompanied by a recognition of the complex interrelationships necessary to sustain natural processes. Man has changed his environment, but has failed to recognize that the energy necessary for this tremendous development is found in finite supplies of resources. He has lost his relationship to the total environment.

What is needed is an educational approach that effectively assists man in understanding the complex interrelationships and his role in managing those relationships. What is needed is an educational thrust in all areas of the curriculum designed to teach citizens of all ages to take their place as stewards of their environment. Such a program is called "environmental education."

Environmental education is an interdisciplinary area of study that must be fully integrated into all areas of the curriculum. It involves:

- active participation by students.
- the use of all the senses in learning.
- learning something new in relation to what is already known.
- discovering for oneself.
- learning through group dynamics.
- processing information and experiences.
- feeling a need to learn.
- a sense of personal responsibility.
- confidence in one's ability to affect change.

Environmental Education: A State Concern

Although primarily considered an agricultural, rural-orientated state, Iowa has not been unscarred by the Age of Energy. With a population of 2,825,041, Iowa has approximately 2,000,000 registered motor vehicles. Iowa presently is among the leaders in expansion of electrical energy use. Of the total population, approximately 800,000 live in the seven largest metropolitan areas. The state is bisected by one of the central trans-continental highways in the nation and is bordered by two of the major transportation arteries of the Missouri-Mississippi River system.

Iowa is one of the major centers of agri-business in the nation. Associated with the growth of production in agri-business has been increased cultivation of land, increased use of commercial fertilizers, increased dependence on natural gas and increased use of gasoline powered equipment.

The increase in agri-business has also increased the problems of:

- o wind and water erosion
- o allocation of gasoline, fuel oil and natural gas
- o water pollution from agricultural run-off
- o additives to food supplies
- o growth of urban centers and land use questions
- o increased demands for energy and electrical generation.

The "Future -- Iowa 2000" Conferences actively involved citizens in the discussion of these environmental concerns. The Governor's Committee on Conservation of Outdoor Resources developed a state plan for environmental education. As part of this plan, environmental education was defined as follows:

> Environmental education is a life-long process which will, through every aspect of formal and non-formal education, help each citizen develop a philosophy and life-style which is in harmony with the concept of man as a participant in resource use and conservation.
>
> It strives to produce a citizenry that understands ecological principles and environmental problems, can rationally evaluate options for preventing and solving these problems, and is motivated to work for their solution.
>
> Environmental education involves an instructional program which interrelates the total educational experiences in achieving these goals.

Senator John Culver, in an address to the Council Bluffs Junior Chamber of Commerce stated:

> "I think we need to be aggressively looking towards our own future, deciding on the kinds of priorities we want for ourselves right here at home, and giving hard thought to the steps we will need to take to achieve them.
>
> "Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution. (The University of Michigan School of Natural Resources)."

Project SCATE: An Approach to Environmental Education

Project SCATE (Students Concerned About Tomorrow's Environment) has as an objective the active participation of students in the investigation of environmental problems and the political processes necessary to implement solutions to those problems in a participant democracy. Four central areas of concern have been identified for Project participants:

1) land use policy development

2) air and water quality

3) energy allocation and consumption

4) economic considerations related to the quality of life.

Both in objective and in areas of concern, Project SCATE is interdisciplinary in focus. The investigation of environmental problems in the area of energy, air and water quality, and land use capability requires the use of concepts, generalizations and theories from the physical sciences. Investigation of problems in the area of economic considerations, quality of life and political processes requires the use of concepts, generalizations and theories from the social sciences.

The individual social and physical sciences are brought together as the student(s) focus on a particular problem and the solutions to the problem. A problem in the area of energy allocation and consumption, for example, requires an understanding of the concepts of combustion, energy, work, B.T.U., matter, etc. from the discipline of physics. The problem may also require an understanding of the chemistry concepts of pH ranges, oxygen, hydrogen, mineral, etc. From the area of biology concepts of aquatic life, bacteria, algae, growth, organisms, etc. are of concern as the factor of water pollution from heating of water or run-off from slag is considered. Supply and demand, resources, capital, cost, etc. are concepts from economics that must be considered. In addition, the consideration of solutions involves sociological and psychological concepts; i.e., socioeconomic status, roles, values, group affect, etc. Finally, political science concepts of leadership, law, decision-making, etc. must be considered in enacting solutions.

In the focus on a particular problem, interrelationships between problem areas, and between concepts and theories from several disciplines are brought into view. Figure 1 illustrates these interrelationships.

Figure 1
Interrelationships Between the Four Areas

Discipline Area	Problem Area: Land Use	Air and Water Quality	Energy Allocation and Consumption	Economic Considerations Related to the Quality of Life
		CONCEPTS		
Biology	Adaptation Agricultural pollution Biological control Ecological impact Ecosystem Greenbelts Ground cover PH Mulch Wetlands	Acquatic plants Car on dioxide Bacteria Bloom Aeration Anaaerabic Biodegradable Biological control Affluent Enrichment Fungi Herbicide Hydrology Nutrients Organisms Zoo plankton	Fossil fuel Combustion Decomposition Digestion Hydrology Methane	Acclimation Acclimatization Adaptation Food chain Habitat Natural selection Pathogenic Vegetation Organic Ecological impact Ecosystem
Chemistry	Acid Organic PH Phosphates Soil conditioner Leaching	Activated carbon Acid Carbon dioxide Carbon monoxide Coagulation Combustion Chlorinated-hydrocarbons Detergent Distillation Flocculation Fluorides Fungicide Heavy metals Hydrocarbons Incineration Isotope Limnology Nitric oxide , Organo phosphates Oxidant Ozone Phenols PH Photochemical oxidants Polyvinyl chloride Vinyl chloride Vaporization	Combustion Fossil fuels Hydrocarbon Methane Natural gas Sulfur dioxide	Adulterants Fluorides Chlorinated hydrocarbons Heavy metals Ozone Synthetics Toxicity Vinyl chloride

Figure 1 (cont.)

Discipline Area	Land Use	Air and Water Quality	Energy Allocation and Consumption	Economic Considerations Related to the Quality of Life
Economics	Cost Consumption Free Market Public Private Reclamation Resource Solid Waste Waste Supply Demand Transportation Conservation	Cost Free market Pollutant Process weight Strip mining Utility Resource Solid waste Waste Supply Demand Transportation	Cost Consumption Free market Pollutant Public Private Resource Supply Demand Conservation Recycling Resource recovery Scrap Waste Transportation Profit	Cost GNP Free market Public Private Resource Supply Demand Consumption Transportation Conservation Solid Waste Waste Utility Tax Distribution
Geography or Earth Science	Aquifer Channelization Coastal zone Dystrophic lakes Impace statement Estuaries Eutrophication Filling Ground water Humus Impoundment Leaching Muck soils Oligotrophic lakes Percolation River basin silt Soil conditioner Surface water Topography Troposphere Water shed Wetlands Structure PH Erosion Transportation	Air mass Ambient air Aquifer Atmosphere Benthic region Biosphere Channelization Chilling effect Contrails Dredging Effluent Eutrophication Ground water Heat island effect Hydrology Impoundment Limnology Mechanical turbulance Oligotrophic lakes Percolation Potable water River basin Stable air Surface water Thermal pollution Water shed	Fossil fuels Strip mining Geothermal Hydropower Solar energy	Chilling effect Strip mining Heat island effect Erosion Transportation

Figure 1 (cont.)

Discipline Area	Land Use	Air and Water Quality	Energy Allocation and Consumption	Economic Considerations Related to the Quality of Life
Physics	Geo thermal Measurement Distance Earth Orbit Planet Temperature	Expansion Gas Hydrogen Inversion Point source Surface tension	Atomic Conservation Carbon Compression Electric current Electricity Energy Force Friction Heat energy Hydrogen Geiger counter Inertia Kilowatt Kinetic Light energy Motion Nuclear Power Speed Sunlight Temperature Velocity Watt Work	Calorie Energy Heat energy Light energy Nuclear power Sunlight Temperature Work Free enterprise Natural monopoly
Political Science	Local County State National Public Domain Private Domain Riparian Rights Zoning Land use Mineral rights Law Regulation	Anti-degradation clause Interstate Intrastate Federal Point source Riparian rights Regulation Transportation Utilities EPA Corps of Engineers Impact statement Public hearing	Interstate Intrastate Riparian rights Regulation Interstate Commerce Commission Regulation Utilities Public hearing Law	Interstate Intrastate Regulation Freedom Utilities Impact statement Public hearing Law Referendum Initiative Taxation

Figure 1 (cont.)

Discipline Area	Land Use	Air and Water Quality	Energy Allocation and Consumption	Economic Considerations Related to the Quality of Life
Sociology	Habitat Mobility Crowding Community Urban area Rural area Norms Ecology Greenbelts Ethnocentrism Human needs Mores Urbanization	Norms Human needs Mores	Norms Distribution Mobility Human needs Mores	Acclimatization Adaptation Ecology Environment Natural selection Status Role Life cycle Senescence Social class Cooperation Cultural lag Ethnocentrism Social system Human needs Mores Urbanization

Figure 1 serves to point out a number of the curriculum areas that may provide input into the investigation of the four problem areas selected for Project SCATE. The concepts listed are suggestive of organizers that may be used in developing investigations in each area, but are not exclusive. Many additional concepts in each curriculum area may relate to an investigation in any of the problem areas.

Figure 1 may also be used to develop alternative learning activities for students. Each discipline area of concept within a discipline area may be used as the focus for investigation of a student or set of students. A generalizing activity may then be used to bring the full investigation together.

In addition to the conceptual structure provided in Figure 1, nine process themes that are applicable across each of the problem areas and in each of the discipline areas have been selected for Project SCATE. The nine process themes are:

1. Observing - the process of using one's senses to obtain information about oneself and the world around one.

2. Classifying - the process of systematically imposing order on collections of objects or events.

3. Defining - the process of describing a thing or event in terms that provide a classification, a physical description and/or that which results from conducting a given procedure.

4. Measuring - the process of using an instrument to estimate a quantitative value associated with some characteristics of an object or event.

5. Sampling - the process of systematically selecting a part of a whole in order to determine the quality or nature of the whole.

6. Surveying - the process of systematically viewing or considering something as a whole or the process of making a general examination.

7. Hypothesizing - the process of stating a tentative general explanation of a large number of events.

8. Testing - the process of conceiving of counter-examples to a general explanation and gathering data to determine if sufficient numbers of counter-examples exist to determine the explanation inadequate or invalid.

9. Decision-making - the process of using data collected through the other processes to make, interpret and enforce a rule or action.

The organizing themes approach is suggested for the development of investigations. Organizing themes can be developed around concepts such as those listed in Figure 1, process themes such as those provided above, or phenomenon and persistent problems. Phenomenon defines anything that is derived from direct and real experiences. "Nuclear power plan" is a phenomenon that might be used as an organizing theme, but "nuclear power" is not. Likewise, "oil" is a phenomenon that might serve as an organizing theme; "B.T.U." is not. The goal of explanation in all scientific endeavors is to explain phenomenon.

Persistent problems are those that focus on the interaction between science and society, and require investigation from several of the specialized sciences. Persistent problems that might serve as organizing themes are; "energy shortage," "urban sprawl," "water pollution," "full employment" and "food supply."

"Problems" as defined for use as an organizing theme is a felt concern. When students develop a concern that their own beliefs, attitudes, concepts, or values in an area are inadequate; when students are aroused to the point that they want to learn enough to be able to "do something about it;" then a problem has been developed. Problems may arouse a student emotionally, upset the students, perhaps even make the student angry. The main concern is that the problem arouse the student to the point that he/she is willing to engage in an active pursuit of knowledge about the problem and solutions to the problem. Active participation is a major goal of Project SCATE and a problems approach is considered one very useful means to develop this activie participation.

Figure 2

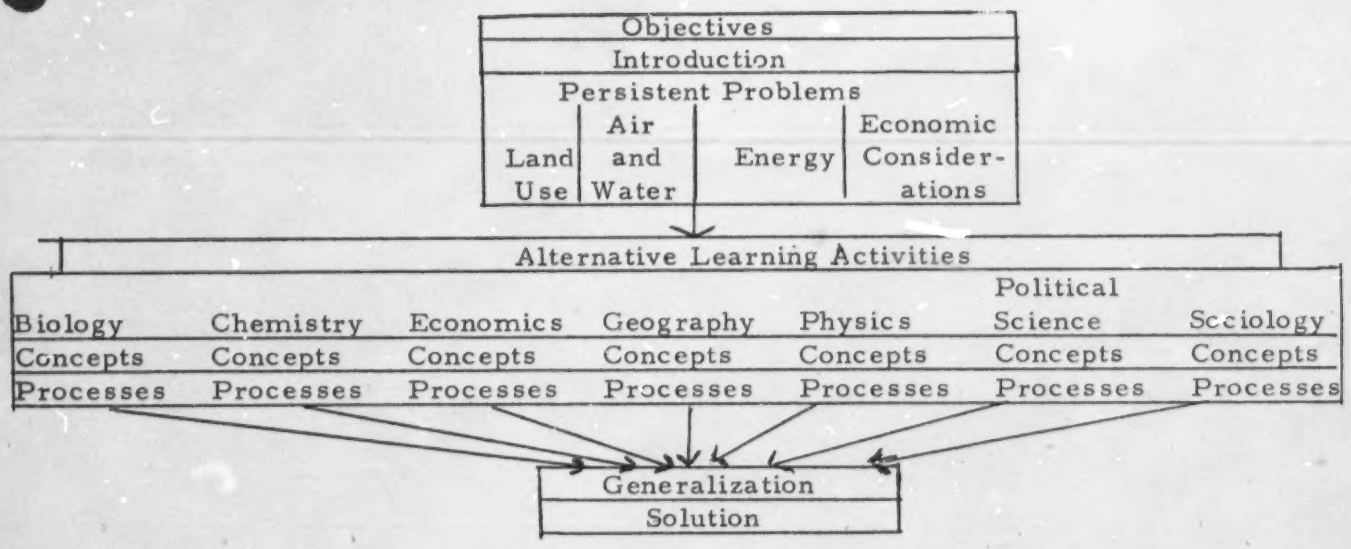


Figure 2 presents a visual representation of the structure of units as presented thus far.

The following units have been developed as models for initiating investigations in Project SCATE. Each unit may be used as the basis for instruction or as a model or suggestion for the development of local units.

Project SCATE

Unit: Planning Research

Objectives

1. Students shall be able to identify environmental issues of personal concern.
2. Students shall be able to identify resources for investigation of environmental issues of personal concern.
3. Students shall be able to plan investigation procedures to research environmental issues of personal concern.

Introductory Activity

1. Objective: Students shall be introduced to environmental problems in the area of:

   a) Land Use Policy Development

   b) Air and Water Quality

   c) Energy Allocation and Consumption

   d) Economic Considerations Related to the Quality of Life

2. Suggested Activities:

   a) Film that provides an overview of the current environmental concerns

   b) Short readings that provide an overview of the current environmental situation

   c) A field trip to view land use, energy, air and water quality, and the quality of life problems in the local community

Suggested Films:

Environment (28 minutes-color)

Probes the complex issues of ecology, showing that some destructive practices involving advanced technology are also closely tied to the needs and strengths of a modern industrial society. Questions whether or not the preservation of our environment can be accomplished without sacrificing our technology and life-style. (1971 Dist - BFA)

The Environment (11 minutes-color)

Presents an introduction to the study of energy as it relates to the central issues of man's relationship with the world in which he lives. (Dist NBCEE)

American Wilderness (53 minutes-color)

Shows how our technological society is exerting great pressure on wild areas in terms of development and raw materials, and also in terms of recreational use. (Dist NBCEE 1971)

Energy - A Matter of Choices (22 minutes-color)

Points out that the energy crisis has caused Americans to re-examine their beliefs in endless technological progress, perpetual economic growth and unlimited material comforts. Gives an overview of the energy sources we depend on, surveys the attitudes that are the basis of our patterns of energy consumption and examines the choices available to us as we attempt to resolve the energy crisis. (Dist EBEC 1973)

Identifying A Problem of Personal Concern

1. Objective: Given a checklist of issues, students will be able to identify general and specific issues of personal concern.

2. Suggested Activity: Students complete the "Identifying An Issue of Personal Concern" questionnaire that follows.

IDENTIFYING AN ENVIRONMENTAL ISSUE OF PERSONAL CONCERN

The four areas of focus can be used for identifying an environmental issue of personal concern by using the following checklist:

ENVIRONMENTAL ISSUES

1. What do you feel are the most urgent environmental concerns? (Rank the categories in number of priority.)

___ Land Use problems
___ Air and Water quality problems
___ Energy allocation and consumption problems
___ Economic considerations related to the quality of life

2. What do you feel are the most urgent environmental concerns in each category? (Rank each concern under each category according to the number of its priority.

A. Land Use Problems

___ Highway construction
___ Loss of natural habitats for wildlife
___ Loss of available farm land
___ Flood control
___ Aesthetically and functionally poor architectural design
___ Lack of comprehensive regional planning
___ Inadequate and shaddy construction
___ Lack of planning to prevent future environmental problems
___ Lack of planning to solve current environmental problems
___ Lack of adequate housing
___ Solid waste disposal
___ Erosion
___ Loss of parks, open space, lakes and natural areas
___ Siting of facilities, e.g. nuclear power plants, power transformers, power lines, etc.
___ Strip mining
___ Deep mining
___ Visual blight (litter, billboards, etc.)
___ Urban sprawl
___ Others

B. Air and Water Quality Problems Emissions:

___ Trash burning
___ Home furnaces
___ Industrial and power plants
___ Automobiles, trucks, buses, airplanes, motorcycles
___ Lack of adequate mass transportation

Pollutants:

___ Pesticides, herbicides and toxic metals
___ Water additives
___ Radiation
___ Destruction of the ozone layer
___ Aeresol cans
___ Contamination of ground and water surfaces by chemicals, dyes, etc.
___ Agricultural runoff
___ Soft waste disposal

General Water Problems:

___ Flood control
___ Lack of water use plans
___ Limitation of fresh water supplies
___ Sedimentation
___ Thermal discharges
___ Others

C. Energy Allocation and Consumption:

___ Lack of adequate mass transportation
___ Drain on nonrenewable resources
___ Lack of development of new energy sources
___ Distribution of energy
___ Economically inefficient automobiles
___ Traffic shortages
___ Lack of efficiency in use of energy
___ Lack of efficiency in production
___ Status products (Energy Consumers: stereo, T.V., freezers, hairdryers, electronic toys, etc.)
___ Lack of consumer knowledge
___ Poor construction (houses, schools, etc.-energy waste)
___ Others

D. Economic Considerations Related to the Quality of Life

___ Lack of adequate housing
___ Lack of adequate job opportunities
___ Life-styles detrimental to environmental quality
___ Poverty
___ Inflation
___ Inadequate educational opportunities
___ Noise pollution
___ Adequate educational opportunities
___ Noise pollution
___ Adequate food supplies
___ Poor distribution of resources
___ Large gaps between rich and poor
___ Lack of land and resource ethics
___ Lack of recycling for nonrenewable resources
___ Improper management of resources
___ Lack of quality in products
___ Others

Identifying Resources Related to An Issue of Personal Concern

1. Objective: Given the identification of a problem of personal concern, students shall be able to identify resources for obtaining information on the problem.

2. Suggested Activity: Given the identification of an area of personal concern, students complete the appropriate portion of the "Identifying Potential Resource Services" form for both the state and federal departments.

IDENTIFYING POTENTIAL RESOURCE SERVICES

The next step in the investigation procedure may be the identification of resource services on the issue. The following checklist may be helpful in identifying resource areas.

A. Land Use Problems

Departments (State):

___ Department of Agriculture
___ Environmental Protection (Attorney General)
___ Conservation Commission
___ Development Commission
___ Geological Survey
___ Highway Commission
___ Industrial Commission
___ Mines and Minerals
___ Natural Resources Council
___ Soil Conservation

Departments (Federal):

___ U.S. Atomic Energy Commission
___ Environmental Protection Agency
___ Office of Environmental Affairs
___ Environmental Policy Division of the Congressional Research Service
___ Office of Ecology, Peace Corps Environmental Program
___ Department of the Army-Environmental Office
___ Department of Housing and Urban Development
___ Office of Community and Environmental Standards
___ National Park Service
___ Bureau of Mines
___ Bureau of Reclamation
___ Geological Survey
___ Department of Transportation
___ Federal Highway Administration

B. Air and Water Quality

Departments (State):

___ Environmental Protection (Attorney General)
___ Environmental Quality
___ Soil Conservation
___ Agriculture
___ Conservation Commission - Divisions of Lands and Waters
___ Health

Departments (Federal):

___ Atomic Energy Commission
___ Environmental Protection Agency
___ Council on Environmental Quality - Executive Office
___ Environmental Policy Division of the Congressional Research Service
___ Office of Ecology - Peace Corps Environmental Program
___ Environmental Office - U.S. Department of the Army
___ National Oceanic and Atmospheric Administration - Department of Commerce
___ Environmental Research Laboratories - NOAD
___ Office of Environmental Affairs - Department of Commerce
___ Assistant Secretary for Environmental Quality - Department of Defense
___ Office of Community and Environmental Standards - HUD
___ Office of the Secretary of the Navy
___ Department of State
___ Coast Guard Marine Environmental Protection Division
___ Public Health Service
___ Food and Drug Administration

C. Energy Allocation and Consumption

Departments (State):

___ Environmental Protection (Attorney General)
___ Consumer Protection
___ Commerce Commission
___ Conservation Commission
___ Development Commission
___ Environmental Quality
___ Geological Survey
___ Industrial Commission
___ Mines and Minerals
___ Natural Resources Council

Departments (Federal):

___ Atomic Energy Commission
___ Environmental Policy Division of the Congressional Research Service
___ Office of Ecology, Peace Corps Environmental Program
___ Assistant Secretary for Environmental Quality-Department of Defense
___ Bureau of Mines-Interior
___ Navy
___ State

D. Economic Considerations Related to the Quality of Life

Departments (State):

___ Environmental Protection (Attorney General)
___ Consumer Protection (Attorney General)
___ Civil Rights Commission
___ Commerce Commission
___ Development Commission
___ Economic Opportunity
___ Employment Opportunity
___ Employment Security Commission
___ Environmental Quality
___ Highway Commission
___ Industrial Commission
___ Labor Bureau
___ Revenue
___ Social Services
___ Vocational Rehabilitation

Departments (Federal):

___ Farmers Home Administration
___ Forest Service
___ Economic Development Administration
___ Housing and Urban Development
___ Office of Community Development
___ Office of Community and Environmental Standards
___ National Park Service
___ Johnny Harrgon Coordinator
___ Bureau of Outdoor Recreation
___ Manpower Administration -Job Corps
___ Health, Education and Welfare
___ Food and Drug Administration

Once the Environmental issue and resources have been identified, some additional questions that you may desire to answer are:

1. What is the impact of this issue?
2. What amount of community support is likely on the issue?
3. Will action or activities related to this issue develop negative attitudes in the community?
4. Is there an existing law or regulation covering the issue?
5. Has any previous research or discussion taken place on the issue?
6. Is the problem manageable?
7. Does the issue have a place within the priorities of the community or the state?
8. What means can be used to measure the extent of the problem?
9. What is the cost in researching this problem?
10. What are the chances of success for action on this issue?

Clearly Stating a Problem

1. Students shall be able to clearly state a problem, and shall demonstrate this ability by identifying a problem area of concern, the limits of the problem they will research within that area of concern and the problems within the area which will not be researched.

2. Suggested Activity: Answer the following questions

   a. What type of problem will you research?

      1) An urban land use problem?
      2) An agricultural land use problem?
      3) A recreational land use problem?
      4) An air quality problem?
      5) A water quality problem?
      6) An energy allocation problem?
      7) An energy consumption problem?
      8) An energy production problem?
      9) An economic consideration?
      10) A quality of life consideration?

   b. If possible give the geographic boundaries of the problem.
   c. What evidence did you find to make you believe a problem exists?
   d. Who or what do you believe to be the cause of the problem?
   e. What problems in the area are you <u>not</u> researching?
   f. What terms or words are important in describing the problem?
   g. What definition are you using for each term?
   h. State the problem in one sentence.

Asking Questions to Gather Information

1. Objective: Students will be able to develop useful questions to gather information on their problem, and shall demonstrate this ability by submitting five to ten questions they will use in their research.

The questions should meet the following criteria:

   a. Be clearly related to a proposition (a suggested cause of a problem or a suggestion that a problem exists).

   b. Yield useful and important information.

   c. Be clearly and precisely stated.

   d. Be as unbiased as possible.

2. Suggested Activity:

Have students read the following interview and answer the questions which follow.

In the following interview, a man named George Finley asks a nuclear engineer John Beasley a series of questions regarding nuclear power plants. Read the interview carefully. You will be relying on George's questions to provide you with information on nuclear power plants.

A. George Finley: "Mr. Beasley, what college did you attend?"
John Beasley: "M.I.T."

B. George Finley: "What is the present cost of a pound of uranium?"
John Beasley: "Today uranium costs $25 per pound, up from $7 per pound in 1973."

C. George Finley: "Nuclear power plants are the most dangerous development of the present century. Why do you continue to endanger the rest of us by supporting them?"

John Beasley: "I don't believe they are dangerous when compared with the danger of running out of energy."

D. George Finley: "How do you deal with research into alternatives?"
John Beasley: "What do you mean? Alternatives to what?"

E. George Finley: "Do any long-haired liberal, radical freaks who are likely to steal plutonium work in nuclear power plants?"

John Beasley: "Mr. Finley, you know that the length of a person's hair doesn't have anything to do with their dependability."

F. George Finley: "How much of the potential energy in uranium ore do your present power plants use?"

John Beasley: "One or two percent."

1. Based upon the questions asked, what do you know about nuclear power plants?

_____

_____

_____

2. Which questions were most useful in gathering information about nuclear power plants?

_____

_____

Questions need to be significant. Answers to the question must yield useful and important information. Question A, "What college did you attend?", does not provide useful information. Mr. Beasley may have attended the most famous nuclear engineering school in the nation, but he may have majored in recreational therapy or automotive engineering. Write a question that will yield useful and important information.

_____

_____

_____

In formulating questions, you need to specify what you need to know. Questions should be clearly related to a proposition. Question C, "Why do you continue to endanger the rest of us by supporting them?" is not clearly related to anything that Mr. Finley needs to know. Write a question that is clearly related to what you want to know.

_____

_____

_____

A question needs to be clearly and precisely stated, Question D, "How do you deal with research into alternatives?" fails to be clear or precise. The term "deal with" is vague and the term "alternatives" does not have a clear reference - Mr. Beasley asks, "alternatives to what?" Write a question that is clear and precise.

_____

_____

_____

A final criterion for asking questions is that the questions remain as unbiased as possible. A slanted or biased question will not yield useful information and will often anger the person being questioned. Questions C and E, "Nuclear power plants are the most dangerous development of the present century, why do you continue to endanger the rest of us by supporting them?" and "Do any long-haired, liberal radical freaks who are likely to steal plutonium work in nuclear power plants?", are both biased questions.

Write two questions that are unbiased.

_____

_____

_____

Now write five to ten questions you will ask your resources as you conduct research on the issue you have selected.

Determining Testable and Non-Testable Statements

1. Objective: Students will be able to distinguish testable and non-testable statements, and will demonstrate this ability by identifying six statements as testable or non-testable and providing reasons for their decision.

2. Suggested Activity: Read the following discussion of testable and non-testable statements and complete the exercise that follows.

Testable statements are statements for which you can imagine counter-examples: i.e. examples of the description of the statement being true, but for which you can imagine an example of the consequence of the statement being false. Now, you are probably more confused than you were to begin with. We will attempt to eliminate some of the confusion by some examples.

The statement, "All dogs have brown eyes." is testable because I can imagine a dog with green eyes or blue eyes. Furthermore, the statement is testable because I can look for dogs with blue eyes or green eyes and if I find one I will prove the statement false. I can expect to find a dog that does not have brown eyes and still be considered a reasonably sane man.

Let's look at a second statement, "All dogs are mortal." This statement is <u>not testable</u>, it is true by definition of terms. I can not imagine an existing dog that is immortal (a dog that will live forever). Furthermore, the statement is not testable because I cannot imagine a test to use to determine if a dog will live forever. If I began such a search, my sanity would surely be questioned. People would be saying, "Look at that weird fellow, he is looking for a dog that will live forever. Something sure scrambled his brains."

Here are two more examples. The statement, "Hank Aaron broke Babe Ruth's career home run record of 714 home runs." is testable. I can imagine that Hank Aaron did not break Babe Ruth's record and I can look for evidence that he did not. If I desire to go to the trouble, I can look up the box score for every regular season game that Hank Aaron played and count the home runs, one by one. Of course I would be foolish, but I could do it.

The statement that, "In baseball, a pitched ball that is swung at and missed is a strike." is <u>not testable</u>. It is true by the rules of baseball. As long as I am playing or watching baseball, I cannot imagine a situation where a ball is pitched, the batter swings the bat and misses and it is not a strike.

You may realize by now that most non-testable statements are statements that cannot be proven false by evidence, they are true by the definition of words being used or by the rules or laws of the "game." Here are some more examples of non-testable statements:

All flies are insects.
A kilogram is one-hundred grams.
Each state of the United States has two senators.
A whale is a mammal.
Coal is a fossil fuel.
The amount of crude oil available in the United States is finite (a fixed amount).

Below are six additional statements. Decide if they are testable or non-testable and give reasons for your decision.

1. If the sun is directly overhead, then it is noon.
2. All rivers in the State of Iowa are polluted.
3. Automobiles are the largest contributors to air pollution.
4. If an organism produces chlorophyll, then it is a plant.
5. Protecting the environment for future generations is good.
6. If the consumption of energy is reduced, then the production of energy will also be reduced.

One form of non-testable statement that is very important to research is a definitional statement. A statement of definition usually places an object or action being defined into a large class and then distinguishes that object or action from other members of the class by providing distinguishing characteristics. It is common to place the term being defined in quotation marks. Some examples follow.

"Erosion" is the wearing away of land by wind or water.
A floating device that is used to contain oil on a body of water is a "boom."

A widespread body of air with properties that were established while the air was situated over a particular region of the earth's surface and that undergoes specific modifications while in transit away from that region is an "air mass."

List five non-testable statements that will be important to your research. (definitions that will be important to your research)

_____

_____

_____

_____

_____

Testable statements are also very important to your research. One type of testable statement you will use is a <u>fact</u>. A fact is a testable statement that has been tested and the evidence supports the statement being true. For example, as I write this I have on a blue tie. If one of my friends walks up and says, "You have on a blue ties this morning," they have made a testable statement (it is conceivable that I am wearing an orange tie) and the evidence supports that statement as true (all the evidence they need is what their eyes see and the concepts of various colors).

Other examples of statements of fact are:

The United States imports more oil today than they did in 1973.

There are large deposits of coal in the United States.
Fish are returning to the Detroit River.
Fall plowing increases the amount of top-soil lost to erosion during a year.

Which of the following are statements of fact?

1. Activated carbon is a highly absorbent form of carbon used to remove odors and toxic substances from gas.

2. Agriculture contributes 2½ billion tons of solid waste to water pollution each year.

3. Biodegradable products decompose quickly as a result of the action of micro-organisms.

4. Fog occurs more often in the spring than in the fall.

5. An increase in air pollution lowers the temperature of the earth.

6. DDT was first used for insect control during World War II.

Hypotheses, educated guesses about the solutions to a problem, must be testable statements. If they are not testable, then the guess can never be proven right or wrong, and no new knowledge will result.

If you will review what has been said previously about testable statements, the function of hypothesis testing becomes rather easy to understand. Remember that a testable statement is a statement for which you can imagine a situation where the criteria or descriptive portion of a sentence applies, but the consequence or concluding part of the sentence does not apply. In the example of my tie, the criteria or descriptive part of the sentence is, "The tie you are wearing." This portion of the statement establishes the limits of the things we are talking about. The consequential or concluding part of the sentence is, "is blue." We can imagine the possibility that the tie is <u>not</u> blue. We test the "hypothesis" by observing the tie I am wearing. We do not look for a blue tie, but for the presence of a <u>not blue tie</u>. In other words, <u>we look for evidence that the hypothesis is true</u>.

For each statement below, circle the <u>criteria</u> section of the statement, underline the <u>consequence</u> section of the statement and describe the evidence you would seek to test the statement.

1. If phosphates enter a body of water, then the amount of algae growth will increase.

_____

_____

_____

2. Semi-trailer trucks consume more fuel than railroads for each one-thousand pounds of freight transported.

3. Solar energy can be used to heat homes in Iowa during 80 percent of the heating season.

4. Agricultural wastes result in more water pollution than industrial wastes.

What is the hypothesis for your research?

What is the conceivable situation in which the criteria or descriptive portion of your hypothesis applies, but the conclusion or consequence of the hypothesis does not follow?

What evidence will you look for to test your hypothesis?

Inductive Reasoning - Generalizing from a Sample to the Larger Group

1. Objective: Students shall understand the concept of random sampling and the process of generalizing from a sample to a larger group, and shall demonstrate this understanding in a mini-sampling exercise.

2. Suggested Activity: Read the following description of random sampling and complete the activities.

Random sampling is a process of acquiring information from one part of a larger whole in order to provide information on that larger whole. For example, if we sample a one-eighth piece of pie, we can generalize about the whole pie. From the sample we will know the type of pie it is (cherry, apple, blueberry, etc.), whether the pie is sweet or sour, whether the crust is flaky or hard, and whether we like the pie or not. Although we cannot be absolutely sure that each piece of pie will be exactly like the one we sampled (there may be variations due to the way the pie dough and filling was mixed), we have more reason to believe that the remainder of the pie will be like our sample than we have reason to believe that our piece of pie is different from the rest.

The size of the sample we use to generalize about the whole should increase as the size of the total increases. If we are sampling all of the pies produced by a large bakery, we cannot sample one piece from every pie produced. We must have a systematic procedure for selecting pies to sample. The basic rule we must follow is that every individual pie must have an equal chance of being sampled.

Mathematicians and scientists have developed a system for sampling from a large population like our population of pies. The system is random sampling and the use of a table or random numbers. The process is basically described below:

1. Decide on the size of sample we are going to use. If our bakery produces 5,000 pies each week, we must decide the number of pies we must sample to be able to make general statements about the total number of pies. It is evident that 5 pies would be too few and 500 pies would probably be too many for us to easily sample. Therefore, we select a number of pies that seems large enough to represent the total number, but is within our ability to sample. Let's choose a sample size of 50. Of course, the larger the sample size we select, the greater our confidence will be in our statements about the 5,000 pies.

2. Select the fifty pies that we will sample in such a way that each pie has an equal chance of being selected. (Note: We cannot select one pie, lay it aside and select the next pie because this violates the equal chance rule. In selecting the first pie, each pie has 1 chance out of 5,000 of being

selected. If we lay the first pie aside, then as we select the second pie of our sample each pie has 1 chance in 4999 of being selected. Thus, the odds have changed and the rule of equal chance of being chosen has been violated.) We provide for an equal chance by using a table or random numbers such as the one provided below. Before using the table we must make some rules; how will we select the first number? will we move up or down from the first number? will we move right or left when we reach the end of a row? These rules must be made on a chance basis; i.e. close your eyes and point to find the first number, flip a coin to make decisions on up or down, right or left.

3. Sample our fifty pies.

4. Make generalizations to the total number of pies.

Assume that out of the fifty pies sampled, 26 were cherry pies 14 were apple pies, 5 were apricot pies, 3 were blueberry pies and 2 were raisin pies. Describe the total 5,000 pies.

_____

_____

_____

List each member of your class and assign each person a number. Use the table of random numbers to select a sample of seven from the class. Describe the probable composition of the class (boys, girls, blue eyes, brown eyes, etc.) from the sample of seven. Compare your sample conclusions with the class as a whole. How well does your sample description match the description of the class? Repeat this exercise five times. Are any of the samples not representative of the class? Are the samples more often representative of the class or not representative?

Remember: Do not remove the individual from the total population when their number has been drawn. This will violate the equal representation rule.

Developing a Survey Questionnaire

1. Objective: Students will know the basic rules for developing a survey questionnaire, and will demonstrate this ability by developing a questionnaire and conducting a survey in their class, school or local community.

2. Suggested Activity: Read the following description of the survey technique and complete the exercises provided.

Surveys are used to determine how citizens feel about a certain issue, to predict how citizens will vote in an election or to gain specific information about a population of people (number of cars owned, television shows watched, type of fuel used for heating or cooking, etc.). The basic tool of a survey is the questionnaire. The questionnaire may be filled out by the person taking the survey as he/she asks the questions, or it may

be filled out by the person answering the questions. A good questionnaire will include background information on the individual answering the questions; i.e. age, sex, marital status, occupation, etc. The selection of the background material requested will be determined by the purpose of the questionnaire. The purpose of the background information is to compare the population sampled with the total population.

A good questionnaire should be designed to acquire the information necessary to answer a research question to test a hypothesis; e.g. the questionnaire should be designed for a specific purpose and to provide information related to a specific problem. The questionnaire should be simple to read, as short as possible and clear in its purpose. The questions asked should meet the following criteria:

a. Be clearly related to a proposition
b. Yield useful and important information
c. Be clearly and precisely stated
d. Be as unbiased as possible (see section F)

Develop a survey questionnaire of from five to ten questions related to your research topic.

TABLE OF RANDOM NUMBERS

	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	37-40
1	23 15	75 48	59 01	83 72	59 93	76 24	97 08	86 95	23 03	67 44
2	05 54	55 50	43 10	53 74	35 08	90 61	18 37	44 10	96 22	13 43
3	14 87	16 03	50 32	40 43	62 23	50 05	10 03	22 11	54 38	08 34
4	38 97	67 49	51 94	05 17	58 53	78 80	49 01	94 32	42 87	16 95
5	97 31	26 17	18 99	75 53	08 70	94 25	12 58	41 54	88 21	05 13
6	11 74	26 93	81 44	33 93	08 72	32 79	73 31	18 22	64 70	68 50
7	43 36	12 88	59 11	01 64	36 23	93 00	90 04	99 43	64 07	40 36
8	93 80	62 04	78 38	26 80	44 91	55 75	11 89	32 58	47 55	25 71
9	49 54	01 31	81 08	42 98	41 87	69 53	82 96	61 77	73 80	95 27
10	36 76	87 26	33 37	94 82	15 69	41 95	96 86	70 45	27 48	38 80
11	07 09	25 23	92 24	72 71	26 07	06 55	84 53	44 67	33 84	53 20
12	43 31	00 10	81 44	86 38	03 07	52 55	51 61	48 89	74 29	46 47
13	61 57	00 63	60 06	17 36	37 75	63 14	89 51	23 35	01 74	69 93
14	31 35	28 37	99 10	77 91	89 41	31 57	97 64	48 72	58 48	69 19
15	57 04	88 65	26 27	79 59	36 82	90 52	95 65	46 35	06 53	22 54
16	09 24	34 42	00 68	72 10	71 37	30 72	97 57	56 09	29 82	76 50
17	97 95	53 50	18 40	39 48	83 20	52 23	08 25	21 22	53 26	15 87
18	93 73	25 95	70 43	78 19	88 85	56 67	16 68	26 95	99 64	45 69
19	72 62	11 12	25 00	92 26	82 64	35 66	65 94	34 71	68 75	18 67
20	61 02	07 44	18 45	37 12	07 94	95 91	73 78	66 99	53 61	93 78
21	97 83	98 54	74 33	05 59	17 18	45 47	35 41	44 22	03 42	30 00
22	89 16	09 71	92 22	23 29	06 37	35 95	54 54	89 88	43 81	63 61
23	25 96	68 82	20 62	87 17	92 65	02 82	35 28	62 84	91 95	48 83
24	81 44	33 17	19 05	04 95	48 06	74 69	00 75	67 65	01 71	65 45
25	11 32	25 49	31 42	36 23	43 86	08 62	49 76	67 42	24 52	32 45

Project SCATE Unit: Model Assembly Developed from guidelines submitted by Steve Crawford, Grinnell High School, Grinnell, Iowa

Organizing Theme: Decision-making Time Period: 225 minutes class time

Objectives:

A. General Objective

Each student shall participate in the process of group decision-making by majority vote and will experience the processes of developing a proposal, supporting a proposal in debate and organizing support for a proposal

B. Specific Objectives

1. Each student shall participate with a partner to develop a proposal that is understood by other class participants as displayed by the ability of participants to debate the proposal without confusion with regard to meaning.

2. Each student shall develop with a partner a rationale that clearly supports their proposal as displayed by the ability of the student to present argument for the proposal and to answer argument against the proposal in class debate

3. Each student shall develop with a partner definitions of key terms used in their proposal as displayed by the inclusion of definitions in the explanation section of their proposal

4. Each student shall have a basic knowledge of parliamentary procedure as displayed by their participation in debate, in amending proposals and in voting for proposals.

5. Each student shall understand the basic procedures of group decision-making as displayed by the ability to develop support for their proposal.

Activity:

1. Committees are developed composed of four members - one set of partners supporting the pro side of an issue, the other set supporting the con side.

2. The pro partners develop a proposed bill on the issue and the con partners develop an opposing bill, or a minority report.

3. Each set of partners researches the topic or issue and prepares their argument; they become the experts on the issue

4. Each committee may schedule a special hearing at which outside experts may be asked to testify. The special hearing must precede the debate on the issue and must be scheduled on the agenda.

Alternative Activities

Objectives

1. Students shall be able to identify main pro and con arguments on an issue and shall display this ability by developing an argument - supporting their proposal on an issue.

2. Students shall be able to identify facts that can be used to test a pro or con argument on an issue and display this ability by developing facts that negate the opposing argument on the issue.

3. Students shall be able to use various resources to gather data on an issue and shall display this ability by providing evidence to support their proposal on an issue

2. Suggested List of Topics

1. Hunting regulations
2. Regulation of energy
3. Recycling
4. Rights of smokers and non-smokers
5. Land - use policy
6. Urban renewal
7. Environmental protection
8. National health insurance
9. National park system
10. Zoning laws
11. Public recreation facilities

Introduction

Objectives

1. Each student shall display an understanding of current environmental issues by being able to choose an area of interest and to develop a proposal in that area.

2. Each student shall display an understanding of resources available in the school and local community by developing a plan of investigation for an issue

Activity

1. Procedure: Part 1

Procedure - Part One

1) Pick or find a partner

2) Pick a topic on which you may be interested in becoming an "expert"

   A) There will be two committees (teams) for each topic taking opposing or differing viewpoints

   B) The topic must be approved by your instructor

   C) The topics may concern any environmental issue

3) Create a bill drafted from your topic of interest - the instructors will advise on the form to be used

4) Bills will be debated and either passed, amended, rewritten, or defeated

5) It is important to know laws that are currently in force about your topic and understand facts behind them

5. Form of Bill

I. Title

II. Who this bill affects - (may or may not apply)

III. Reasons this bill is necessary - define current problems

IV. Provisions of the bill - try not to be too wordy the simpler and more to the point the better

V. Exclusions - who or what may not be affected by this bill (may or may not apply)

VI. Funding - how much money is needed, if any

VII. Definitions - any term that may be taken in more than one context should be defined to suit the needs of the authors

Generalization

A. Objectives

1. Each student shall be knowledgeable of basic procedures for parliamentary debate and shall display this ability by participating in the classroom argument on issues.

2. Each student shall be knowledgeable of procedures of group decision - making and shall display this knowledge by use of processes in attempting to pass a proposal.

B. Activity

1. Procedure Part 2.

1) Two students are a committee and are responsible for their proposal

2) The remainder of the class is the Legislative body

3) The bills, when completed, should be placed in the hands of the rest of the members of the class.

4) If the bill is not clearly understood, points should be deducted from the score

2. Procedure

1) An agenda should be drawn up by the instructor

2) Basic Parliamentary Procedure rules should be examined and followed

3) Debate will be directed by the presiding officer (instructor) - using discretion it shall be free and open

4) Students should find allies to support their proposed bills-trade votes if necessary

5) Majority vote -wins presiding officer votes only in case of ties

6) Use supporters in the debate - possible outside information experts

7) Each session should be discussed at the end of each class period (3-5 minutes)

3. Evaluation

Evaluation - 50 points maximum per team

Group Points
25 points for correctly writing a bill

10 points for passing your bill

5 points maximum for amendments that are added by the individual

10 points maximum for your debate and discussion-this is given by the instructor at his discretion-the 10 points, will only be given to totally outstanding individuals

4. Evaluation Sheet

Name_____ Lab_____ IG_____

Partner'(s)_____ Topic_____

	Points given	Comments
Writing a bill (25 pts. max.)		
Passing a bill (10 pts. max.)		
Amendments by the individual (5 pts. max.)		
Debate-discussion (10 pt. max.)		
Total points		

Lab Instructor_____

General Comments:

Project SCATE UNIT: Land Use

Prepared by Ronald Harshman from materials developed by Jim Kessler, Newton High School, Newton, Iowa; Kendra Glasgow, Clarinda High School, Clarinda, Iowa; and from materials developed by Eber Eldridge, Extension Economist, Cooperative Extension Service, Iowa State University

Organizing Theme: Land Use

Objectives

1. Each student shall determine his personal philosophy toward land use and express an oral or written rationale for that philosophy.

2. Each student shall recognize competing forms of land use and be able to list four or more competing forms of land use for a given parcel of land.

3. Given competing forms of land use for a given area of land, each student shall be able to rank the forms of land use from least intensive to more intensive.

4. Each student shall participate in an activity that requires "hands-on" experiences with land and shall develop a set of criteria for alternative land uses based on the "hands-on" experience.

5. Each student shall be able to define in his own words "land use policy."

6. Each student shall select an area of undeveloped land and describe that area as he sees it and as one person with an occupational concern for the land (a forester, farmer, industrialist, park director, etc.) would see it.

Process Themes

1. Observing

2. Classifying

3. Defining

4. Decision-making

Introduction

Objectives:

1. Each student shall recognize his existing attitudes toward land-use and display this recognition by completing a rating of several alternative land use attitudes.

2. Each student shall be familiar with the concept "land use policy" and display his familiarity by orally or verbally defining "land use policy."

3. Each student shall be familiar with the intensity of alternative land uses and shall display this familiarity by rating a series of land uses as high, medium or low intense land use.

Activities:

A. Rating Alternative Land Uses (10 minutes)

Instructions: Below are described 4 attitudes toward the use of land which various persons, at various times, have advocated. You are to write numbers in the margin to indicate whether you like or dislike each of these attitudes. Remember that is not a question of what kind of attitude you now have, or what kind of attitude is most popular, or the attitude that might be good for other people, but simply the kind of attitude that you would personally be willing to live by. Use the following scale, and write one of these numbers in the margin alongside each of the attitudes toward land use:

5 - I like it alot.

4 - I like it a little.

3 - I am indifferent to it.

2 - I dislike it a little.

1 - I dislike it alot.

___ Attitude 1: I believe that land was made for man's use and that progress is inevitable. There is a nearly unlimited supply of land left to change for man's benefit. I feel that land should be used in the way that will produce the highest economic profit for its owner. A land owner should be free to do as he pleases with his property with few governmental restrictions. Saving the beautiful landscapes, birds, wildlife, and trees that environmentally concerned individuals talk about are of little importance beside really important things like money, jobs, food, and housing. I can't blame a man for selling his land to the highest bidder, no matter what will happen to the land after the sale.

___ Attitude 2: The conservation of resources important to man is essential to our survival. We must carefully protect and use such valuable natural resources as prime agricultural land, minerals such as coal, game animals, forests and their lumber, and all other resources that are presently of economic and social importance to man. These resources have made our present standard of living possible and we must use them wisely so that other generations of future Americans will benefit, also. Land is a valuable economic resource and so must be used in ways that will keep it producing food, lumber, or game animals as long as possible.

___ Attitude 3: Ecological balances are too delicate and land is too expensive for conservation to be takenhaphazardly. I believe that there should be no more man-made changes of the environment unless it is proven that the short term benefits also result in long-term benefits. Conservation and development must be planned together, with great care.

___ Attitude 4: I believe that the survial of man is directly related to the survival of all other living things on earth. Our national history has been one of greed and destructive stupidity in relation to nature. Plant and animal communities that had developed over thousand of years have been discovered and destroyed wholesale within decades after the first discovery. The attitude that man can improve on nature and that he is superior to it

must be reversed before we destroy it and ourselves. We must use whatever means that are available to use, including the courts, to preserve wilderness for all generations. Regardless of human desires for food, lumber, and minerals the destruction must stop. Land use policies must be developed that will preserve natural areas for all time or there will soon be none at all. This is a cause crucial to the survivial of all life on earth. I favor strict land use zoning laws and tough enforcement of them.

After ranking the above items, write a paragraph describing your own attitudes toward land use.

B. Defining Land Use Policy (30 minutes)

Land use incorporates all of the activities, occupations, practices and utilization of space, including group space, water space, subsurface and air space. On any given area of land there are numerous land uses, for example; housing, farming, mining, recreation, wildlife habitat, industry, solid waste disposal, etc. The question is, how are we to decide which land use should be made of any area of land? Various competing individuals or groups will answer this question in different ways.

All that man does involves the land. We live on it, play on it, eat from it, travel over it, and are buried in it. Much of what we do to the land is unreversible. Once land is developed for homes, it is different or impossible to return it to productive farm land, a reservoir site, or a wildlife refuge.

Generally land has been used for whatever enterprise would return the most dollars for the amount of land used. With virtually an unlimited amount of land, that system has worked well. For a society that has been primarily concerned with settling the vast space of our nation, the free enterprise system of determining land use by the dollar value of the product was very useful.

However, land like other resources is limited. Today there are 56,280 square miles of land in Iowa. The amount of land remains fixed - we will produce no more land area. At the same time, population is increasing. By the year 2,000 the population of Iowa is expected to increase by 600,000 or to increase from the present population of 2,825,041 to a population of 3,425,041. In contrast to our experiences from past history, these 600,000 additional people cannot plan on moving to new and undeveloped lands. Instead they will have to share areas to live, to play, to work, to gain their food and to get to school with the 2,825,041 people already living in Iowa. How should we divide our land in order to provide for these additional people? Do deer, pheasants, ducks, geese, cattle, hogs, sheep and other animals have a right to share in the land also? If they do, how do we provide for their share? Should we plan the division or should we allow these decisions to be made by individuals?

A land use policy is a pre-determined plan for the wise and fair use of land. Land use policies are determined by city governments, county governments or state governments, depending on the size of area to be regulated by the plan. Plans for the use of land are based on the characteristics of land and the uses of land that have been determined as important by those sharing in the use of the land. Land use policies usually provide for such things as:

1. Providing space for orderly urban and industrial development
2. Reserving the best agricultural areas for farming
3. Providing rules for reasonable use of natural resources including oil, coal, natural gas, limestone, sand and gravel, water, trees and soil
4. Preserving areas of scenic beauty, unique natural communities, historical importance, or cultural significance.
5. Providing areas for recreation and open space
6. Reducing or settling conflicts between individuals and between individuals and society.

Complete the following sentences:

1. A land use policy is _____

_____.

2. If we do not have a land use policy, land will be used_____

_____.

3. The best reason for not having a land use policy is _____

_____.

4. The best reason for having a land use policy is_____

_____.

C. Intensity of Land Use (50 minutes)

Historically, the economy of the United States has operated on three basic assumptions:

- Natural resources are in unlimited supply
- Wastes can be disposed of in a limited space without damage to our environment
- There will always be unlimited space for our population and our economic activity.

Today we know that:

- Natural resources are in limited supply
- Wastes can not be disposed of in a limited space without severely damaging our environment
- There is limited space for our population and our economic activity

Historically most land use decisions have been made through the price system. Through the price system individual producers and consumers determine what is produced, how much is produced, and how resources are used. The individual decided what to produce, how much to produce and how to use resources on the basis of what benefited the individual most.

In land use, the price system dictated that land use gravitate to the most intensive use because the intensive use generally gives the highest return for each dollar invested. By this system a wildlife area will become a farming area if the land is suitable. Likewise, farming land will become feedlots, and feedlots will become residential sites, industrial sites or business sites. Since the more intensive use returns more on the investment, the buyer for a more intensive use can outbid all others in the market place.

Many of the land use decisions made by the price system cannot be reversed. Farm land converted to a feedlot might be returned to farming, but farm land converted to residential areas or industry or a reservoir cannot easily be returned to farming. Thus, land use decisions are often unreversible and are made not just for today but for many centuries to follow.

In the first column

Rank order the following land uses on the basis of what you believe are the most important uses for Iowa residents. Rank from 1, most important, to 7, least important.

___ ___ Agriculture - food production

___ ___ Forestry

___ ___ Industrial growth - new factories

___ ___ Transportation - new roads

___ ___ Urban expansion - new houses

___ ___ Recreation - camping areas, parks and playgrounds

___ ___ Natural areas - undeveloped

In the second column rank order the land uses on the basis of what you believe are the most intensive uses and the least intensive uses. Rank from 1, most intensive, to 7, least intensive.

How does your rank order of importance compare with your order of intensity? If land use gravitates to the most intense land use, will land be used for the purposes you feel are most important?

D. Personal Land Use Policy Attitude

Rank yourself on this land use continuum. Put an X on the spot that best describes your position

Land Use Should be governed by State Law — Land Use Should be Governed by The Market System

1 2 3 4 5 6 7

2 ↓ County Zoning

4 ↓ Local Zoning

6 ↓ Government Purchase

Activity: "Discovering A Biological Community"

Today we will visit a natural area. Due to increasing population pressures, natural areas, such as the one we will observe today, are rapidly disappearing as they become farmland, industrial areas, housing developments, and highways.

The purpose of activities today is to use all of our senses to discover this natural area personally. The average person rarely goes to the woods, marshes, rivers, lakes, and prairies of Iowa to learn the names of plants and animals. Instead he comes to a natural area to soak in the sounds and beautiful sights of nature. These activities are designed to help you to become aware of the fantastic world of a natural community. You will be observing the natural world alone. Relax and let nature get a hold of you.

1. Seton, a famous naturalist, used the following technique to observe nature. You are to take a deep breath and then without moving carefully watch and listen in silence. Try to imagine that nature is becoming a part of you. This should take about 5 minutes. Record your feelings and observations in the blank provided.

2. Sit quietly for 5 minutes. Close your eyes while listening. See how many sounds you can hear. Write down all the sounds you hear. Categorize them as pleasant or unpleasant. Underline the 3 most unpleasant ones and circle the 3 you liked best.

Pleasant Sounds	Unpleasant Sounds
(1)	(1)
(2)	(2)
(3)	(3)
(4)	(4)
(5)	(5)
(6)	(6)

3. Stand and staying in the same spot, rotate your body in a circle with your eyes looking up. Record all the things that you liked during a complete rotation. Repeat this twice more looking straight ahead and later looking down at the ground. Again record all the sights you enjoyed seeing.

Upward	Straight Ahead	Downward

4. Now use all of your senses to observe this natural community. Answer the following questions.

   a. Who are the citizens of this community?

   b. What land uses do these citizens engage in within the natural community?

   c. How do the citizens of this community receive their supplies of energy?

   d. How are the waste products of the community taken care of?

   e. What is the land use policy of this community?

B. Various Viewpoints Toward Land Uses

Objectives

a. Students shall describe a land area as it might be viewed by at least two animals. The description shall include an examination of food, shelter, water, space and other aspects.

b. Students shall describe a land area as it might be viewed by an individual with a professional concern for use of the land.

2. Activity

You will evaluate a natural area from the standpoint of various animals and humans. You will sit quietly in the area. You will try to see it through other eyes and record your observations.

ANIMALS

1. deer	5. owls
2. rabbits	6. robins
3. squirrels	7. foxes
4. snakes	8. mice

(1) Pick 2.

(2) Examine food, shelter, water, space, and other aspects important to your animal. Record your impressions in paragraph form.

INDIVIDUALS

List #1	List #2
Building Contractor	Naturalist
Farmer	Artist
Lumberman	Teacher

C. CHILDREN'S FOREST CONTROVERSY -- A SIMULATION by Mike Cross - Jasper County Environmental Education Coordinator

Objectives

1. Students will analyze a point of view and express and support that point of view.

2. Students will participate in a decision-making process that involves compromise between competing interests.

3. Skills of critical thinking and interpersonal communication will be developed.

The Situation: The Newton School Board and two prominent housing developers have proposed putting a street through the Children's Forest S. 13th Ave. E. with E. with E. 3rd St. S. The reasons put forth for this development are two fold. The Newton High School has been experiencing a severe traffic congestion problem after public activities like basketball games and also every afternoon when classes are dismissed. These streets would help move this traffic more quickly and alleviate this problem. The housing developers must have this road in order to use the property between the high school and Magtag Park for a housing development. These streets, however, would almost totally destroy the Children's Forest Nature Center.

You will assume one of the roles listed below. If you are among those who wish to have the streets put in (pro), then you must be prepared to present arguments that would advance your cause. If you are among those who wish to stop the development (con), then you must likewise be prepared to defend your cause. Your arguments must be restricted to the role you are assuming. If you are on the town council, you must try to objectively sit in judgment. However, some of the council have a vested interest and therefore must render a biased judgment.

THE ROLL:

1 Mayor - Chairs meeting

5 City Council persons (2 own real estate businesses)

2 School Board members - pro

1 School Superintendent - he has not taken sides on the issue

1 Newton High Principal - con

2 Housing developers - pro

1 Road Construction Co. Representative - pro

2-3 Ikettes members - con

2 Newton High Biolgoy teachers

3-5 Ecology Club Members - Newton High Students

SCHEDULE:

Day 1

1. Council meets to plan meeting procedures

2. Con side meets for discussion

3. Pro side meets for discussion

Day 2 - Town Council Meeting

1. A representative from each group will speak - 15 minutes

2. Open discussion (council memebers may ask questions. (10-15 min.)

3. Council vote

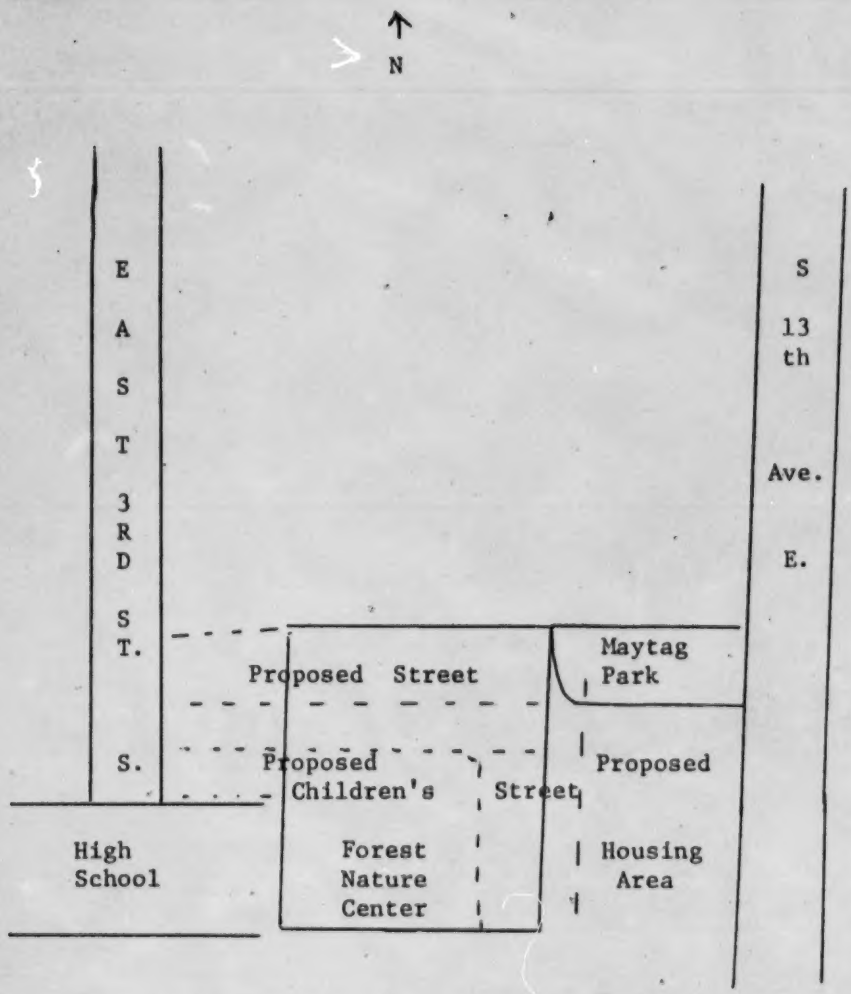
D. A Case Study - The Great Swamp

Objectives

a. Given a case study students will identify an environmental issue

b. Given a case study, students will identify their judgment of an issue and reasons that support that judgment

c. Given a case study, factual statements from the case, and the student's reason for a judgment on the case; students will make a rational decision on the environmental issue and the decision will be logically valid.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Proposed
High
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Forest
Nature
Center
Housing
Area

Great Swamp

Only 30 miles from midtown New York lays a 13,500 acre area of New Jersey know as the Great Swamp.

Nobody lives in the Great Swamp. Nobody wants to. Parts of it are impassable because of quicksand and undergrowth. It is believed to harbor vicious snakes, vermin and disease.

To the New York Port Authority the Great Swamp seems to be an ideal site for a new airport. Conservationists, biologists, botanists, archaelogists, and others have protested the conversion of the swamp into an airport. Swamps, they point out, are not just soggy wastelands. They are essential links in the natural order of life.

The Great Swamp has been a nesting and breeding group for wildlife for thousands of years. Animals, flowers, and trees in their primitive state provide a valuable laboratory for study, as well as a natural source of life for hundreds of species.

Air traffic jams in New York have increased. The problem for New York's existing airports has become troublesome and dangerous. Establishing an airport in the Great Swamp would relieve the problem without placing a noisy airfield near anyone's home or community. (Adoped from: The Conservation Story, American Education Publications, 1969.)

1. Identify the issue in the above description.

2. List the 5 most important facts to you from the paragraphs above and rate them as positive, negative or neutral (ratings should be based on your feelings).

3. Give your judgment on the issue.

4. Why? What is the reason for your judgment on this issue?

5. Briefly describe the philosophy of life that supports your reasons for making the judgment.

A. Acres of land

State =
County =
City =

B. Percent of Land Used As

1. City

a. Residential =
b. Commercial =
c. Industrial =
d. Parks - recreational =

2. Rural (county)

a. Cropland =
b. Pastureland =
c. Forest =
d. Parks - recreational =
e Transportation =

3. State

a. Residential =
b. Commercial =
c. Industrial =
d. Parks - recreational =
e. Transportation =
f. Cropland =
g. Pasture land =
h. Forest =
i. Water areas =

C. Cost of Land (county)

Land Used as:

1. Residential Cost Per Acre =
2. Commercial
3. Industrial
4. Parks - Recreational
5. Cropland
6. Pastureland
7. Forest
8. Transportation cost per acre

D. Dollar Return Per Acre (county)

Land Used As:

1. Residential
2. Commercial

3. Industrial

4. Parks - Recreational

5. Cropland

6. Pastureland

7. Forest

8. Transportation cost per acre

D. Dollar Return Per Acre (county)

Land Used As:

1. Residential

2. Commercial

3. Industrial

4. Parks - Recreational

5. Cropland

6. Pastureland

7. Forest

8. Transportation

V. EVALUATION - Evaluation is by means of comparisons of past unit responses as compared to the introductory response.

A. Defining A Land Use Policy: Complete the Following Sentences

1. A land use policy is _____

_____.

2. If we do not have a land use policy, land will be used._____

_____.

3. The best reason for not having a land use policy is _____

_____.

4. The best reason for having a land use policy is_____

_____.

B. Repeat Exercise A, pages 2-3

II. Urban Studies - Developed by Steve Crawford, Grinnell High School

Objective: To study the structure of the city of Grinnell through investigation of functions of the city.

I. Class is divided into five groups of approximately four persons in a group. They represent:

A. Business and industrial interests - they are to study:
1. Employment of company
2. Wages of workers (white collar, blue collar, office, etc.)
3. Dependence on commerce to move goods - where things come from, go to, etc.
4. Amount of taxes paid by company - tax deductions
5. Expenditures
6. Income of Company
7. Future
8. Government control?

B. Commercial on downtown interests
1. Employment
2. Wages (of all workers)
3. Dependence on moving goods in and out
4. Taxes paid - tax deductions
5. Expenditures
6. Income of business
7. Future - Programs
8. Government control?

C. Public works - (schools, parks, fire dept., police, libraries, sewage, garbage, street)
1. Employment
2. Wages (of all workers), payroll
3. Expenditures
4. Tax money spent
5. Future - programs
6. Government control?

D. Welfare
1. Job availability
2. Benefits paid out
   a) Food stamps
   b) ADC
   c) Unemployment benefits
   d) Others
3. Number of recipients in Grinnell and community
4. Why are people on some type of welfare or unemployed?
5. Future - programs
6. Government control?

E. Housing
1. Availability
   a. Buying
   b. Renting
2. Hand availability
3. Zoning ordinances
4. Mortgages
5. Taxes

(If enough in class)

F. Small Businesses - (construction, roofing, auto repair etc.)
   1. Employment
   2. Wages
   3. Expenditures
   4. Future
   5. Government control?

These are the topics for study and probably more that I haven't mentioned.

Your assignment: Give each group member specific responsibility to go to the different sites in Grinnell. Make up a questionnaire that you can use to compute information that you are looking for. This will be your homework. We will discuss your findings in class. Your instructor will assist you on getting off the ground.

Evaluation:

This will take an entire quarter to accomplish this. Each group will turn in a detailed report of their findings. This should be an extensive work of the individual establishments you went to and conclusions you can draw from your findings.

Analysis:

Your instructor will put together the results of your findings in a booklet for everyone in the class (and may be even taken to the mayor). We will draw our own conclusions about the city from the results.

Details of class procedure will be decided upon as time progresses.

Project SCATE Curriculum Materials
Product Evaluation Sheet

Name _____ Title _____

School _____ Address _____

City _____ State _____ zip _____

A. General

1. Please indicate the course(s) in which you utilized this publication.

_____

_____

2. What additional topics would you suggest be developed for your needs?

_____

_____

3. Would the development/dissemination of a K-12 assessment instrument for environmental education be useful to you?

_____yes _____no

Comment:

4. Is inservice for environmental education a need for you?

_____yes _____no

Comment:

5. What learning stratebies other than the research activities in this packet would you suggest for use in motivating students?

_____Case studies
_____Analysis activities
_____Awareness activities
_____Role playing
_____Simulations
_____Others
_____
_____

B. Specific Product Information

1. Teacher Interest Inventory. Rank the topics below in order of interest to the teacher. (Number 1 is greatest interest, number 2 is the second greatest, and so on).

_____Identifying a problem of personal concern
_____Clearly stating a problem
_____Determining testable and non-testable statements
_____Generalizing from a sample to the larger group
_____Model assembly

_____Land use
_____Discovering a biolgoical community
_____Children's Forest Controversy
_____Great swamp
_____Urban studies

2. Student Interest Inventory. Rank the topics below in order of interest to the student. (Number 1 is the greatest interest, number 2 is the second greatest, and son on).

_____Identifying a problem of personal concern
_____Clearly stating a problem
_____Determining testable and non-testable statements
_____Generalizing from a sample to the larger group
_____Model Assembly
_____Land use
_____Discovering a biological community
_____Children's forest controversy
_____Great swamp
_____Urban studies

3. Were the number of activities provided sufficient for your/the student's use?

_____yes _____no Comment:

4. Were the activities successful in stimulating class room discussion?

_____yes _____no Comment:

5. Were the activities successful in initiating investigations?

_____yes _____no Comment:

6. Did you make use of community resources?

_____yes _____no Comment:

7. Are materials of this type better received by the students than the traditional text?

_____yes _____no Comment:

8. Can these materials stand alone or are other materials required?

Comment:

9. What problems have you encountered with these materials?

Comment:

10. Additional comments:

Thank you for filling out this questionnaire. We plan to put it to good use in future publications. Please return this form to: Ronald Harshman, Curriculum Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.